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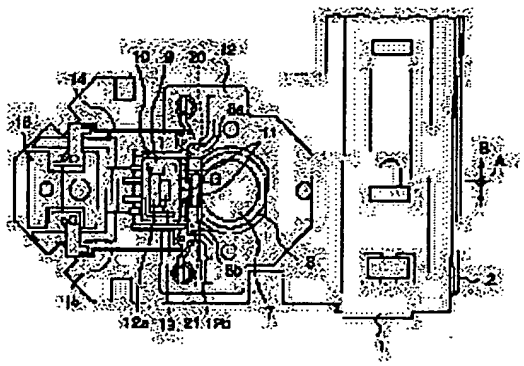
(54) OPTICAL HEAD

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent springs supporting a lens folder from being deformed by an excessive force added to the lens holder holding an objective lens by a fall impact, etc.

SOLUTION: Stopper projections 20, 21 limiting an excessive downward movement of a lens holder 8 are provided at the center of gravity or in the neighborhood of the lens holder 8. Thus, when an excessive force is given to the device by a fall impact, etc., since the upward force is obstructed by a cover, while the downward force is obstructed by the stopper projections 20 and 21 abutting on the upper face of a yoke 12 located in the lower part thereof, springs 14, 15 are prevented from being excessively deformed.



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CLAIMS

[Claim(s)]
[Claim 1] The lens holder holding an objective lens, and the susceptor which supports said lens holder in the state of a cantilever through a spring, In the optical head equipped with the semiconductor laser with which said base [which has the lens-barrel section which counters said objective lens while fixing said susceptor], and objective lens side of said lens-barrel section was attached in the edge of the opposite side The optical head equipped with the stopper projection which restricts too much migration in the lower part of a lens holder to the center of gravity of said lens holder, or its near.
[Claim 2] The optical head characterized by preparing a stopper projection in the direction parallel to the spring which supports a passage and a lens holder for the center of gravity of a lens holder at the position of symmetry of the both sides of said center of gravity of a right-angled direction.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical head used for CD equipment which uses an optical disk as a record medium, MD equipment, DVD equipment, etc.
[0002]
[Description of the Prior Art] Conventionally, this kind of optical head condenses the flux of light by which outgoing radiation was carried out from semiconductor laser to an optical disk side with an objective lens, and it is constituted so that the pit information formed in the disk side may be read in that reflected light bundle. It is right-angled to an optical axis, and in order to have to perform biaxial control of the tracking control moved in the direction of a core of an optical disk and to enable minute control for it, lightweight-izing and thin-shape-izing of an optical head are demanded as the focusing control which moves an objective lens in the direction of an optical axis in order to read pit information correctly.
[0003] Drawing 4 is the outline top view showing an example of the conventional optical head, drawing 5 is the outline cross-section front view, and drawing 6 is the outline cross-section side elevation. In these drawings, 1 is the base made of resin, engages with the pinion and guide rod of a driving gear which a rack 2 and the guide hole 3 are formed, and are not illustrated by one flank, respectively, and moves this whole optical head in the direction of tracking B. The lens-barrel section 4 in the air is formed in the base 1 along the direction perpendicular to the direction of tracking B of focusing A, and the semiconductor laser 5 which carries out outgoing radiation of the laser light is attached in the bottom of bridge wall 4b which has bore 4a through fixing metal 6 at the lower part. An objective lens 7 is held at a lens holder 8, and it is arranged in the upper part of the lens-barrel section 4 so that the lens-barrel section 4 may be countered. The lens holder 8 equips the side of the lens attaching part holding an objective lens 7 with two arms 8a and 8b, and the bobbin 9 is being fixed between them. While the focusing coil 10 is wound around this bobbin 9, two tracking coils 11 are attached. The pieces 12a and 12b of a standup of the pair of York 12 which is fixed to the top face of the base 1 between two arms 8a and 8b again, and constitutes a magnetic circuit are inserted so that the magnetic path of the focusing coil 10 and the tracking coil 11 may be crossed, while passes along the inside of a bobbin 9 and the magnet 13 is being fixed to piece of standup 12a. moreover -- Arms 8a and 8b -- respectively -- **** -- one attachment section of two springs 14 and 15 which pierced thin flat spring and were formed is fixed, and the attachment section of another side of springs 14 and 15 is being fixed to the both sides of the susceptor 16 made of resin. This susceptor 16 is fixed to the top face of the base 1, and the lens holder 8 is supported by this susceptor 16 in the state of the cantilever through two springs 14 and 15. This whole optical head is covered with covering 17, opening 18 is formed in covering 17, and the flux of light from semiconductor laser 5 is irradiated by the optical disk 19 through an objective lens 7 through this opening 18.
[0004] In the above configurations, if the control current is supplied to the focusing coil 10, the force of moving an objective lens 7 in the direction of focusing A will arise by the magnetic flux from the

magnet 13 which constitutes the current and magnetic circuit of the direction of tracking B which flows in the focusing coil 10. This force moves the lens holder 8 supported by susceptor 16 through springs 14 and 15 in the direction of focusing A, and, thereby, focusing adjustment of an objective lens 7 is performed. Moreover, if the control current is supplied to the tracking coil 11, the force of moving an objective lens 7 in the direction of tracking B will arise by the magnetic flux from the current and magnet 13 of the direction of focusing A which flow in the tracking coil 11. This force moves the lens holder 8 supported by susceptor 16 through springs 14 and 15 in the direction of tracking B, and, thereby, tracking adjustment of an objective lens 7 is performed. The objective lens 7 is reproducing information recorded on the optical disk 19 by making the pit train formed in the optical disk 19 condense the laser flux of light by which outgoing radiation was carried out from semiconductor laser 5, receiving again the reflected light bundle from the pit train with semiconductor laser 5, and detecting change of the terminal voltage of semiconductor laser 5, receiving such focusing adjustment and tracking adjustment.

[0005]

[Problem(s) to be Solved by the Invention] In such an optical head, equipment may be thrown at the time of conveyance, or when equipment is a portable type, equipment may be dropped. In such a case, since the lens holder 8 is only supported by susceptor 16 in the state of the cantilever with the very thin springs 14 and 15, too much force joins springs 14 and 15, and it has a possibility of deforming exceeding the elastic limit. When springs 14 and 15 deform, it becomes impossible to perform correctly the above-mentioned focusing adjustment and tracking adjustment. In order to prevent deformation of such springs 14 and 15, enlarging the spring constant of a spring is also considered, but if it does in this way, on the optical head as which big energy is needed since a lens holder 8 is driven in the direction of focusing, and the direction of tracking, and a small light weight is required, it is not practical.

[0006] This invention solves such a conventional problem and aims at offering the optical head which can prevent deformation of the spring by a fall impact etc.

[0007]

[Means for Solving the Problem] This invention prepares the stopper projection which restricts too much migration in the lower part of a lens holder in the center of gravity of a lens holder, or its near, in order to attain the above-mentioned purpose. Thereby, even if too much force joins equipment by a fall impact etc., since the stopper projection prepared in the center of gravity of a lens holder or its near has the migration more than ** prevented in the member of the lower part, it can prevent too much deformation of a spring.

[0008]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to drawing 3 from drawing 1 . The outline cross-section front view and drawing 3 of the outline top view of an optical head [in / in drawing 1 / the gestalt of this operation] and drawing 2 are the outline cross-section side elevation. Since the optical head in the gestalt of this operation has same composition if it removes having prepared the stopper projection from drawing 4 to the conventional optical head shown in drawing 6 , it has given the same sign to the same component of explanation for convenience. In drawing 1 , drawing 2 , and drawing 3 , the stopper projections 20 and 21 pass along the center of gravity G of a lens holder 8, are directions right-angled in the straight line which connects the core of a right-angled direction (the direction of tracking B) or an objective lens 7, and susceptor 16 in the direction parallel to springs 14 and 15, and are prepared in the lower part of the arms 8a and 8b of the lens holder 8 which becomes the position of symmetry of the both sides of a center of gravity G. Moreover, the distance from the lower limit side of the stopper projections 20 and 21 to the top face of York 12 under it is set up somewhat greatly, and becomes the hindrance of focusing adjustment from the maximum lower part coordination distance in focusing adjustment. When too much force joins equipment by a fall impact etc. by forming the stopper projections 20 and 21 in such a location, it can prevent that the force to the upper part is prevented in covering 17, and migration beyond it is prevented [in / force / to a lower part / in the stopper projections 20 and 21 / the top face of York 12 of the lower part], too much force is added at springs 14 and 15, and it deforms.

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[0009] When external force joins equipment by a fall impact etc., the moment will work to the lens holder 8 currently supported by susceptor 16 in the state of the cantilever with springs 14 and 15, but when the stopper projections 20 and 21 hit York 12 of the lower part, that serves as the 2nd supporting point. Since the stopper projections 20 and 21 are formed in the position of symmetry in the gestalt of this operation to the location passing through the center of gravity G of a lens holder 8, and the center of gravity G in that case, the moment which originates in the center of gravity of a lens holder 8 around the stopper projections 20 and 21 used as the 2nd supporting point does not occur, and a lens holder 8 stops, without inclining. On the other hand, when there are no stopper projections 20 and 21 in the location passing through a center of gravity G, the moment resulting from the center of gravity G of a lens holder 8 will occur, a lens holder 8 will incline to the surroundings of the stopper projections 20 and 21 used as the 2nd supporting point, and too much deformation will be brought to springs 14 and 15.
[0010] In addition, in the gestalt of the above-mentioned implementation, although the stopper projections 20 and 21 were formed in the two positions of symmetry of the both sides passing through the center of gravity G of a lens holder 8, depending on the configuration of a lens holder, only one can be prepared in a center-of-gravity location or its near.
[0011]
[Effect of the Invention] As mentioned above, since the stopper projection which restricts too much migration in the lower part of a lens holder was prepared in the center of gravity of a lens holder, or its near according to this invention Since the stopper projection prepared in the center of gravity of a lens holder or its near stops in the member of the lower part even when external force joins equipment by a fall impact etc. Too much deformation of a spring can be prevented and the engine performance of an optical head can be maintained good over a long period of time.

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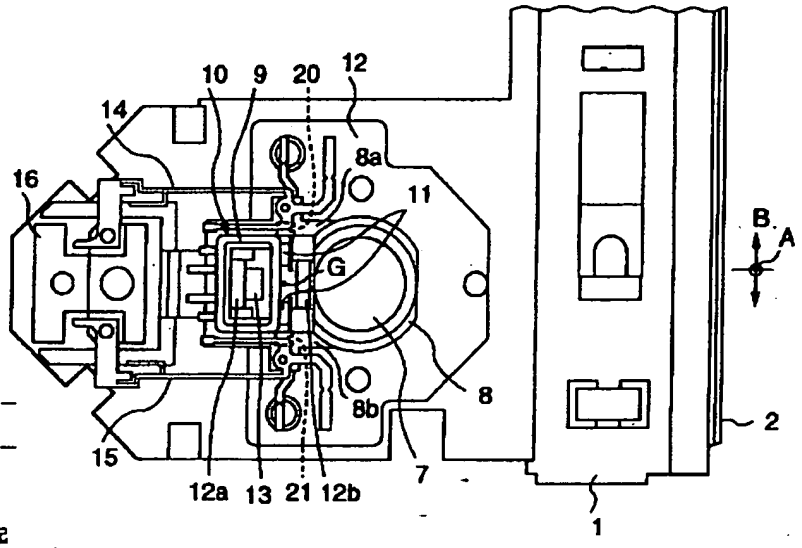
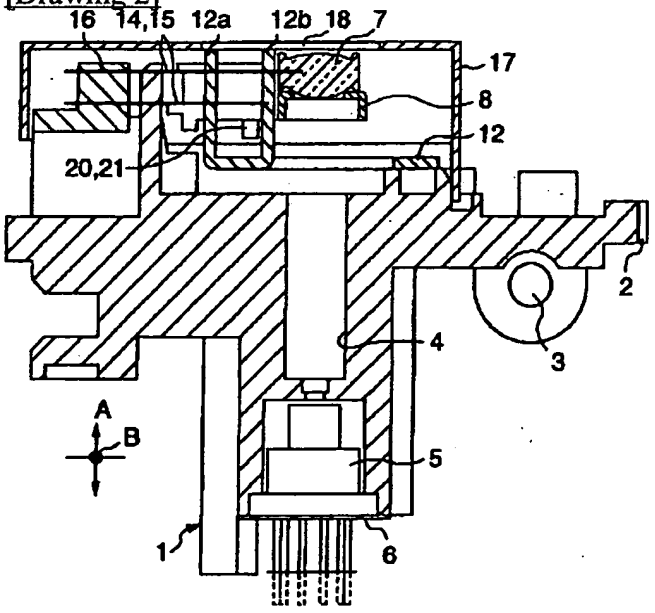
DRAWINGS

[Drawing 1]



1･･･ベース
4･･･鏡筒部
5･･･半導体レーザー
7･･･対物レンズ
8･･･レンズホルダー
14,15･･･スプリング
16･･･支持台
19･･･光ディスク
20,21･･･ストッパー突起
G･･･レンズホルダーの重心

[Drawing 2]



[Drawing 3]

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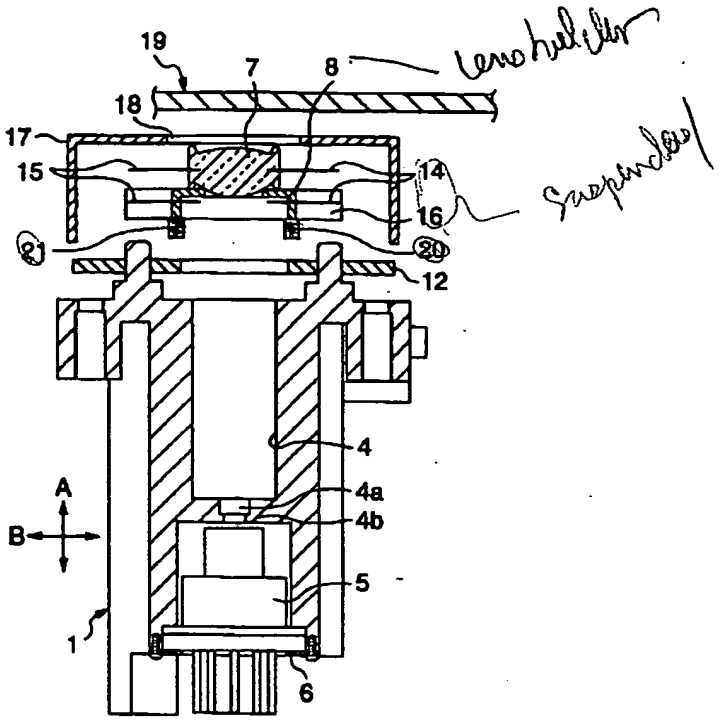
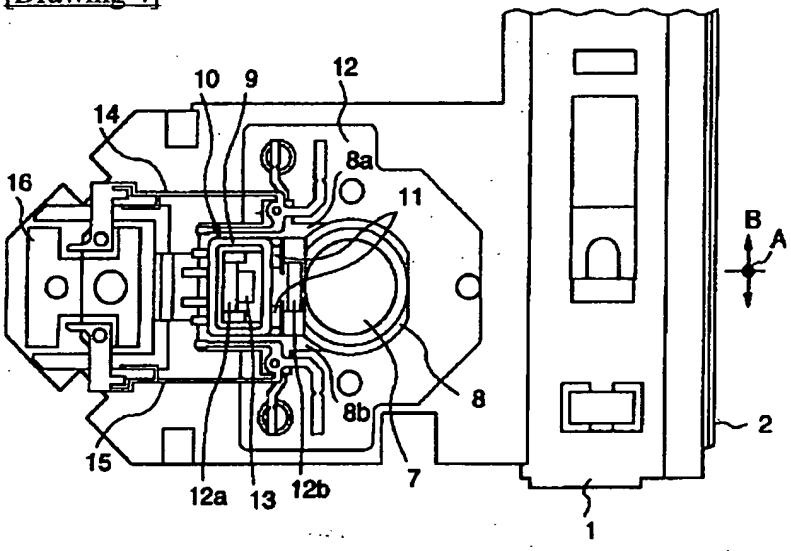


[Drawing 4]



[Drawing 5]

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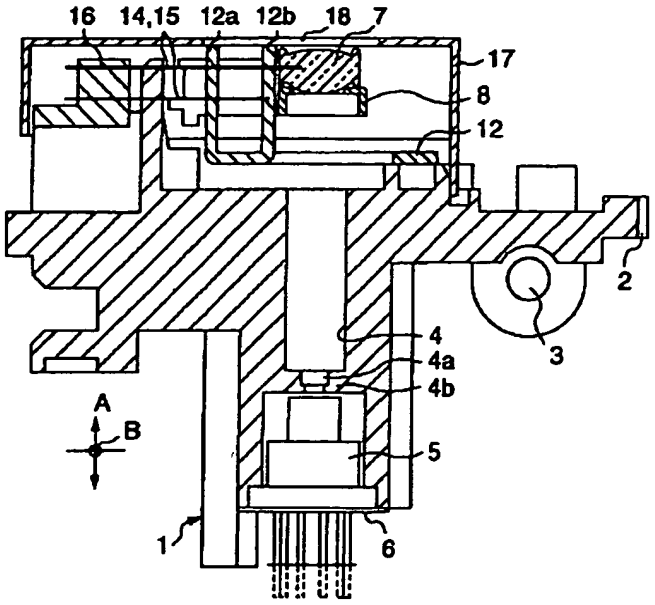
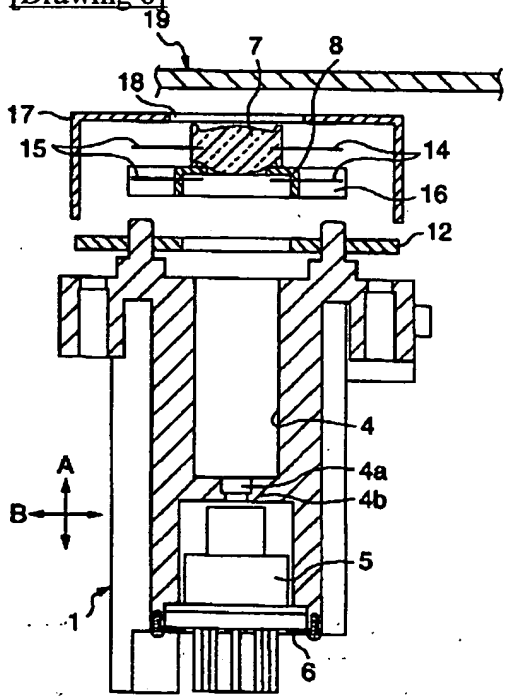


[Drawing 6]



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